

**APPENDIX C**  
**PROCONEX INFORMATION**

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# PROCONEX™

Providing Process Control Expertise

Formerly C.B. Ives & Co.

March 6, 1998

S. G. Lowry Consulting  
438 Sioux Drive  
Mechanicsburg, Pa. 17055

Attn.: Steve Lowry  
Phone: 410-737-2442

Ref.: Don Moyer Trucking  
Quote # WD8-Y0233

Gentlemen,

We are pleased to submit the following quotation for your consideration.



Item	Qty.	Description
1	1	Fisher-Rosemount ROC 306 Remote Operations Controller with fixed number of I/O points, 3 AI, 2 DI, 2 DO. This unit is applied primarily where there is a need for remote monitoring, measurement, data archival and control functions. A local operator interface port is included along with the ROCPAC operating system firmware module Dial-up V.22bis Modem and 110VAC/24VDC power supply.
		Price.....\$ 1,836.00 Delivery.....1-2 weeks ARO
2	1	Nema 4 wall mounted enclosure (12"H x 15"W x 6"D).
		Price.....\$ 580.00 Delivery.....1-2 weeks ARO
3	1	Black Box Modem at PC Location.
		Price.....\$ 200.00 Delivery.....1-2 weeks ARO
4	1	Intellution Fix MMI Development software with license for up to 75 I/O points .
		Price.....\$ 1,500.00 Delivery.....1-2 weeks ARO

3578 Concord Rd.  
York, PA 17402-8626  
(717) 751-0811  
(717) 751-0509 Fax

620 Allendale Road  
King of Prussia, PA 19406-1418  
(610) 337-4660  
(610) 337-4610 Fax

P.O. Box 10696  
Baltimore, MD 21265-0696  
(410) 597-9000  
(410) 265-8370 Fax

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Quote # WD8-Y0233

Item	Qty.	Description
5	1	Intellution Fisher-Rosemount ROC Driver to interface the PC to the Remote Operations Controller.
		Price.....\$ 500.00
		Delivery.....1-2 weeks ARO
6	1	PROCONEX Systems Engineers time to program the ROC 306 and the Intellution Fix Software (8 Hours).
		Price.....\$ 800.00
		Delivery.....1-2 weeks ARO
		<b>TOTAL.....\$ 5,416.00</b>

Note: This quote assumes the following items: (1) 4-20 ma signal is available from the existing Kistler-Morse Ultrasonic Transmitter. (2) There is an existing phone line for the dial up modem at the Nucon Limestone Tank.

Prices are quoted firm for 30 days.

F.O.B. is Marshalltown Ia.

Payment Terms are Net 30, prepay and bill freight

Should this quotation become an order please address it to:

**PROCONEX**  
3578 Concord Rd.  
York, Pa. 17402

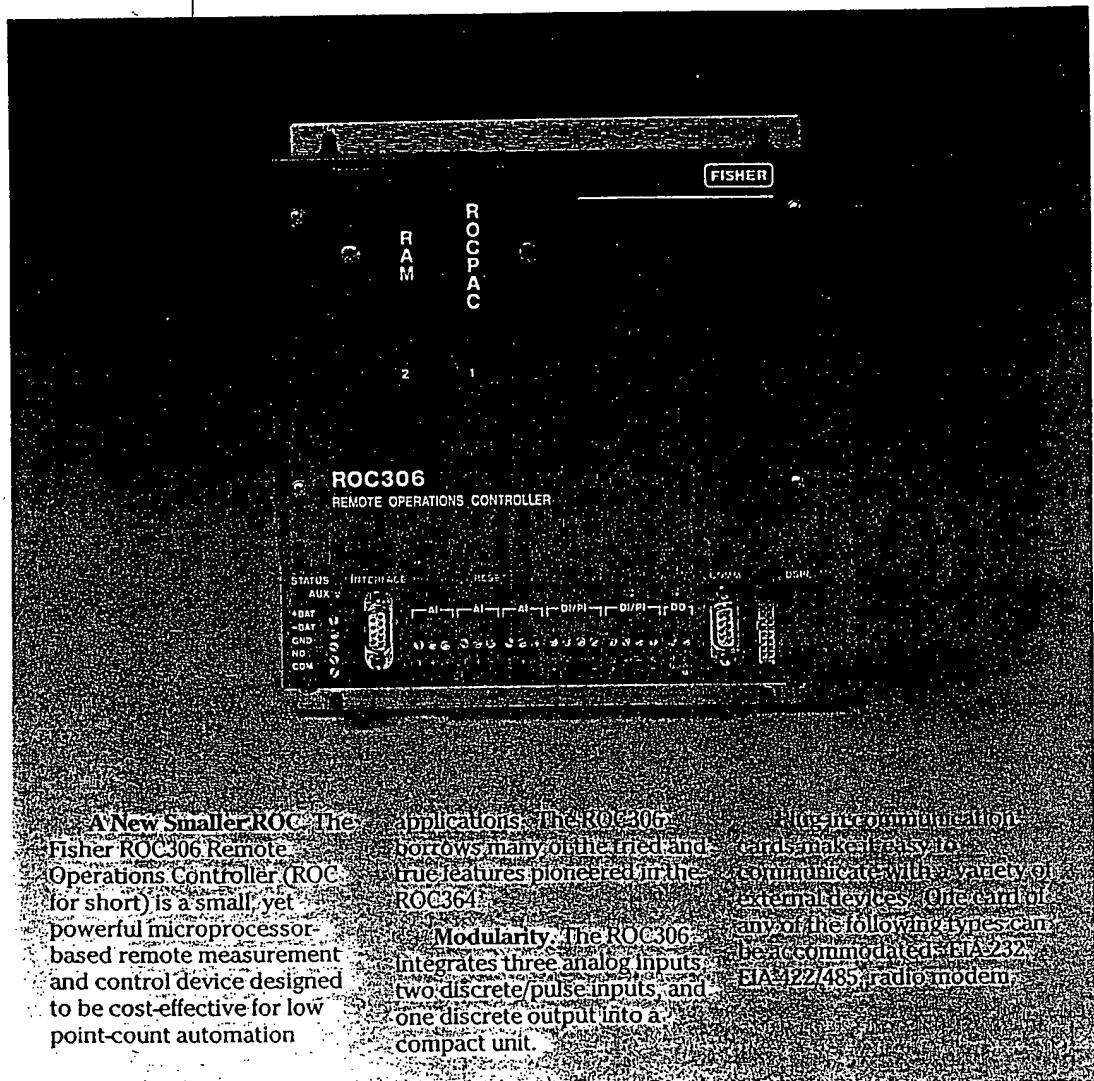
Thank you for the opportunity to quote our products on this application. Should you have any questions concerning this quotation do not hesitate to give me a call.

Very Truly Yours,

**PROCONEX**

*William P. Diehl*  
William P. Diehl  
Sales Engineer  
717-751-0811

# The Fisher ROC306. Small in size. Big in performance.



A New Smaller ROC. The Fisher ROC306 Remote Operations Controller (ROC, for short) is a small, yet powerful microprocessor-based remote measurement and control device designed to be cost-effective for low point-count automation

applications. The ROC306 borrows many of the tried and true features pioneered in the ROC304.

**Modularity.** The ROC306 integrates three analog inputs, two discrete/pulse inputs, and one discrete output into a compact unit.

Plug-in communication cards make it easy to communicate with a variety of external devices. One card in any of the following types can be accommodated: EIA-232, EIA-422/485, radio modem.

**FISHER**

Fisher Controls



Field  
Automation  
Systems

## Type ROC306 Remote Operations Controller

August 1994

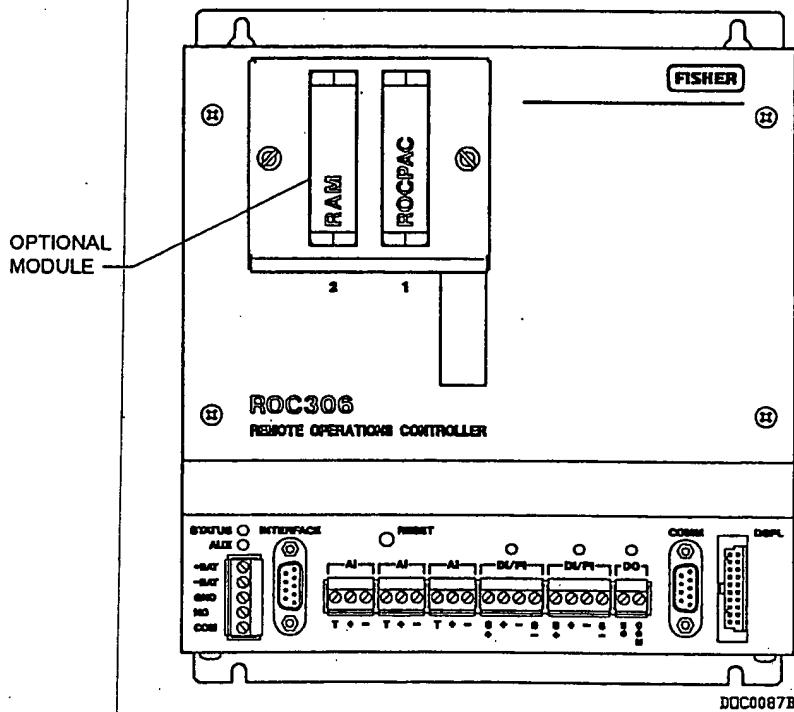
Specification Sheet 2:ROC306

The Type ROC306 Remote Operations Controller (ROC) is a microprocessor-based controller that provides the functions required for a variety of field automation applications. The unit is used primarily where there is a need for remote monitoring, measurement, data archival, and control. The ROC306 is ideally suited to applications requiring flow computation, continuous and batch measurement calculations, PID control, and logic/sequencing control. It is available in two versions: one for hazardous areas, and the other for non-hazardous areas.

The ROC306 uses a single-board design that places all circuitry, including five process inputs and one process output (I/O), on a common circuit board. Both the type of I/O and the number of I/O channels is fixed.

The ROC306 consists of these components and features, which are described in the following paragraphs:

- NEC V25+ microprocessor
- on-board memory
- ROC PAC module
- slot for expansion memory
- three analog and two discrete process inputs
- one discrete process output
- operator interface port
- display port
- mounting provisions for an optional communications card and HART® Interface Card
- power fusing/terminations
- status indicators
- metal chassis and two-piece cover



ROC306 Remote Operations Controller

The NEC V25+ is a 16-bit CMOS microprocessor that runs at 8 megahertz and can address up to one megabyte of memory space.

The ROC306 comes standard with 128K of on-board battery-backed random access memory (RAM) for storing data and 8K of electrically-erasable read-only memory (EEPROM) for storing configuration parameters.

The ROCPAC module contains the operating system, applications firmware (see separate specification sheets), and communications protocol. It also provides another 128K of battery-backed RAM. RAM memory can be expanded as described under "Options."

Three analog inputs, two discrete inputs, and one discrete output are provided for interfacing to measurement and control instrumentation. The characteristics of these I/O channels are software configurable. Once configured, information is automatically passed between the ROC306 and the instrumentation.

Two additional analog inputs are dedicated to monitoring input power and circuit board temperature.

The operator interface port (INTERFACE) provides a means for direct link between the ROC306 and a personal computer. With the personal computer running the Type GV101 Configuration Software (see separate specification sheet), the user can configure the functionality of the ROC306 and monitor its operation.

The display (DSPL) port is dedicated to communications between the ROC306 and a local display panel. Through this panel, the user can access information stored in the ROC306, but cannot configure it.

The communications card expansion sockets allow a communications card and a HART card to be added to the ROC306. The communications card makes use of the COMM port for external communications and can be any of the available ROC300-series communications cards (described under "Options").

Screw terminals located on the front provide terminations for the input power (+BAT, -BAT) and auxiliary output (NO, COM). The auxiliary output consists of a set of normally-open relay contacts that are controlled by software and can be used to switch power to auxiliary devices such as a radio.

Two status indicators are provided: one for system status and one for the auxiliary output. The system status

Indicator, when on, indicates that operation is normal; when blinking, indicates that the ROC306 is not running; and when off, indicates the input voltage is missing or out-of-tolerance. The auxiliary output indicator, when on, shows that the auxiliary output relay is energized (closed).

The ROC306 has a metal case that helps protect the electronics from physical damage. For protection from harsh environments, the unit must be housed in an environmental enclosure (see separate specification sheets).

## Options

The ROC306 supports the following options:

- Expansion RAM
- Communications Card
- HART Interface Card

Expansion RAM is available in RAM expansion modules, which are available in two sizes: 128 and 256 Kbytes. The expansion RAM needed depends primarily on the number of database points which must be archived and on the application programs to be loaded into it.

Additional information about memory modules is contained in a separate specification sheet.

The Communications Card provides an additional port for communicating to and from the ROC306. One card of the following types can be accommodated:

- EIA-232 (RS-232) for asynchronous communications.
- EIA-422/EIA-485 (RS-422/RS-485) for asynchronous communications.
- Radio modem for communications to a radio.
- Private line modem for communications over customer-owned lines.
- Dial-up modem for communications over a telephone network.

Additional information about the communications cards is contained in separate specification sheets.

A HART Interface Card, which requires that a communications card be present to permit its installation, is available to help provide communications with devices using the HART protocol.

Additional information about the HART card is contained in a separate specification sheet.

Specifications			
<b>PROCESSOR</b>	NEC V25+ running at 8 MHz.	<b>AUXILIARY OUTPUT</b>	Quantity/Type: One dry-contact SPST relay, software switched. Terminals: "NO" normally-open contact, "COM" common. Contact Rating: 120 Vac, 5 A maximum.
<b>MEMORY</b>	<b>On-Board:</b> 128 Kbyte battery-backed SRAM for data. 8 Kbyte EEPROM for configuration. <b>ROCPAC:</b> Plug-in module with 128 Kbyte EPROM and 128 Kbyte battery-backed SRAM is standard. <b>RAM Expansion:</b> Plug-in module with 128 or 256 Kbyte battery-backed SRAM is optional. <b>Memory Reset:</b> A RESET switch enables a cold start initialization when used during power-up.	<b>ANALOG INPUTS</b>	Quantity/Type: Three, single-ended voltage-sense (current loop if scaling resistor is used). Terminals: "T" loop power, "+" positive input, "-" negative input (common). Voltage: 0 to 5 Vdc, software configurable. 4 to 20 mA, with a 250 ohm resistor installed across terminals B and C. Accuracy: 0.3% over operating temperature range. Impedance: One megohm. Filter: Double-pole, low-pass. Resolution: 12 bits. Conversion Rate: 30 microseconds. Sample Rate: 50 ms maximum.
<b>OPERATOR INTERFACE PORT</b>	EIA-232D (RS-232D) format for use with portable operator interface. Baud is selectable from 300 to 9600 BPS. Asynchronous, 7 or 8-bit (software selectable), parity (software selectable). 9-socket D-shell connector.	<b>DISCRETE/PULSE INPUTS</b>	Quantity/Type: Two isolated or sourced discrete inputs. Inputs can be software-configured as two medium-speed pulse counters. Terminals: "S+" positive source voltage, "S-" negative source voltage, "+" positive input, "-" negative input. Voltage: 7 to 30 volts (ON state), 0 to 4 volts (OFF state). Frequency: 50 Hz maximum for discrete inputs; 1000 Hz maximum for pulse inputs. Sample Rate: 10 ms for discrete inputs; 50 ms for pulse inputs.
<b>TIME FUNCTIONS</b>	<b>Clock Type:</b> 32 KHz crystal oscillator with regulated supply, battery-backed. Year/Month/Day and Hour/Minute/Second. <b>Clock Accuracy:</b> 0.01%. <b>Watchdog Timer:</b> Hardware monitor expires after 1.2 seconds and resets the processor. Processor restart is automatic.	<b>DISCRETE OUTPUTS</b>	Quantity/Type: One dry-contact relay, SPST. Terminals: "NO" normally-open contact, "COM" common. Contact Rating: 125 volts DC or AC (RMS), 5 A maximum. Isolation: 4000 volts. Frequency: 10 Hz maximum. Sample Rate: 50 ms maximum, software selectable.
<b>DIAGNOSTICS</b>	These values are monitored and alarmed: RAM validity/operation, EEPROM validity, analog input midscale voltage, DI module default status, AO module D/A voltage, DO module latch value, power input voltage, board temperature.		
<b>POWER</b>	<b>Input:</b> 8 to 32 Vdc. 1 watt typical, excluding I/O power. <b>AI Loop:</b> 24 Vdc minimum, 4 to 20 mA is provided for transmitter loop power from an internal power converter. Power is available at the "T" terminals on the analog input connectors. <b>DI Source:</b> Input power is routed to the discrete input S+ terminal.		

Specifications (Cont'd)		
<b>ENVIRONMENTAL</b>	<b>Operating Temperature:</b> -40 to 70 deg C (-40 to 158 deg F). <b>Storage Temperature:</b> -50 to 85 deg C (-58 to 185 deg F). <b>Operating Humidity:</b> 5 to 95% non-condensing. <b>Vibration:</b> Less than 0.1% effect on overall accuracy when tested to SAMA PMC 31.1, Section 5.3, Condition 3. <b>ESD Susceptibility:</b> Meets IEC 801-2, Level 3. <b>EMI Susceptibility:</b> Meets IEC 801-4, Level 4. <b>RFI Susceptibility:</b> No effect on operation of unit when tested per SAMA PMC 33.1 in field classified as 3-abc with field strength of 30 V/m, circuit board properly mounted, and cover installed.	<b>DIMENSIONS</b> Overall: 2 in. D by 8 in. W by 8.88 in. H (51 mm by 203 mm by 225 mm). Add 1.5 in. (38 mm) to depth dimension for memory modules. Mounting: 6.5 in. W by 8.5 in. H (165 mm by 216 mm) between mounting holes.
	<b>WEIGHT</b> 3.2 lbs (1.5 kg) nominal.	
	<b>ENCLOSURE</b> Metal chassis and two-piece cover meet NEMA 1 rating.	
	<b>APPROVALS</b> Non-hazardous area version: approved by FM (Factory Mutual). Hazardous area version: Approved by FM for hazardous locations Class I, Division 2, Groups A, B, C, and D.	

#### Accessories

A number of accessory items are available for the ROC306 that provide environmental housing, power, communications, and local monitoring. These items are described in separate specification sheets and Order Entry Document II. See your Fisher Sales Representative for more information.

#### Ordering Information

Ordering information is contained in Section 7 of Order Entry Document Volume II.

While this information is presented in good faith and believed to be accurate, Fisher Controls does not guarantee satisfactory results from reliance upon such information. Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding the performance, merchantability,

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Field  
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ROC300-Series Operating  
System Firmware

November 1993

Specification Sheet 2.1:FW1

The ROC300-Series Operating System Firmware provides the complete operating system for a ROC300-Series Remote Operations Controller (ROC). The operating system fully supports these functions:

- o Real-Time Clock
- o System Variables
- o Input/Output Database
- o Analog Input Calibration
- o Historical Database
- o Event and Alarm Log Database
- o Communications
- o Self-Testing and Monitoring
- o Custom Displays

The firmware is written in the "C" programming language and is packaged in a ROCPAC memory module. The ROCPAC module contains both erasable programmable read-only memory (EPROM) as well as random access memory (RAM). The ROCPAC module plugs into a socket on the Master Controller Unit (MCU).

The firmware makes use of configuration parameters which are stored by the firmware in either non-volatile (battery-backed) RAM or in electrically-erasable programmable read-only memory (EEPROM) depending upon user requirements. Configuration is performed using Type GV101 Configuration Software running on a personal computer that plugs into the MCU.

Database values are stored in non-volatile (battery-backed) RAM. The amount of memory required depends upon database requirements.

### Applications Support

The operating system firmware can support application-specific firmware packages and are supplied in the ROCPAC module. The application firmware packages, which are described in separate specification sheets, include:

- o ROC300-Series AGA Flow Firmware
- o ROC300-Series PID Control Firmware
- o ROC300-Series Function Sequence Table Firmware
- o ROC300-Series Tank Management Firmware
- o ROC300-Series AGA Report

### Real-Time Clock

The real-time clock is user programmable for year, month, day, hour, minute, and second and is used to provide time and date stamping of the historical database, event log, and alarm log. The clock can also maintain the day of the week and correct for leap year.

### Performance

The operating system is structured around eight tasks that are executed on a 100 millisecond cycle. The tasks are executed in a priority order with the most important tasks being performed first. The eight tasks are: I/O, system, communications, database, user, FST, PID, and AGA tasks. Each task is performed once every 100 milliseconds except for I/O and system tasks, which are performed twice every 100 milliseconds as required.

### Input/Output Database

The number of input or output points supported by the operating system firmware includes the fixed I/O points in the ROC306 or ROC312 and any I/O modules plugged into a ROC312 or ROC364. The firmware automatically determines the type and location of each I/O module. Each input and output is assigned a point in the database along with its configuration parameters. The user assigns values, statuses, or identifiers to these parameters as appropriate.

During normal operation, the firmware scans each input placing values from the input into its respective database point. These values are stored in the database and can be displayed, reported, or archived.

### Historical Database

The historical database provides archiving of measured and calculated variables for on-demand viewing, printing, or saving to disk. The historical database can be configured to archive the current value, average value, totalized value, or accumulated value of a point over a period of one minute, one hour, or one day. The totalized value of a point can be archived for a period of one hour or one day. Four

types of historical databases are archived: Min/Max database, minute database, periodic database, and daily database.

#### **Event and Alarm Log Databases**

The event log database records the last 240 occurrences of parameter changes and power on/off cycles and the alarm log database records the last 240 occurrences of alarms. The values can be viewed, printed, or saved to disk by the user.

#### **Communications**

The operating system supports both local and remote communications to devices using its own specialized communications protocol. This protocol supports serial communications directly to local devices, and radio or telephone communications to a host computer through a modem. One EIA-232 communications port is standard on all ROCs and is dedicated for use with a configuration device. Two optional communications ports are supported on the ROC364, and one optional port is supported on both the ROC306 and ROC312.

The operating system also supports standard communications protocols which allow the ROC to be integrated into systems employing non-Fisher communicating devices. These standard protocols are available as separate software modules and include:

- o Modbus ASCII protocol
- o Modbus RTU protocol
- o Hewlett-Packard HP48000 protocol

Other protocols can be supported on a customer-special basis.

Dedicated communications support is provided for the ROC300-Series Local Display Panel through the DISPLAY port located on the front of the ROC. The display panel can

access the database values gathered and stored by the operating system and display them upon operator request.

#### **Self-Testing and Monitoring**

The operating system firmware supports self-testing and monitoring of the ROC300-series hardware. Items checked and verified by the firmware include:

- o RAM integrity
- o Real-time clock
- o I/O module identification
- o System voltages
- o Master Controller Unit board temperature
- o Watchdog timer
- o A/D accuracy check for analog input modules
- o D/A accuracy check for analog output modules
- o Loop check for discrete outputs

#### **Custom Displays**

The custom display capability is used to enhance operator efficiency. Displays can be created that contain only those parameters that the operator needs to, or is allowed to, change. All other information can be made inaccessible for system security.

The operating system firmware supports custom displays which are created using the Type GV101 Configuration Software. Two displays can be stored in the firmware while additional displays can be stored on the GV101 software diskette. Custom displays can contain both static and dynamic information. The static information consists of alphanumeric labels and graphical characters. The dynamic information consists of database values. By combining static and dynamic information, an exact schematic representation of the application can be created along with up-to-date values of key parameters.

Specifications (Cont'd)			
EVENT AND ALARM LOG	<p><b>Event Log:</b> Records all editing operations and power-up power-down.</p> <p><b>Alarm Log:</b> Records the setting and clearing of all alarms.</p>	COMMUNICATIONS (CONT'D)	<p><b>Display Port:</b> Dedicated port for parallel communications to ROC300-Series Local Display Panel.</p> <p><b>Protocol:</b> Serial ports use Fisher-developed, 8-bit binary using CRC-16 error checking. Other protocols can be supported.</p>
COMMUNICATIONS	<p><b>Serial Ports:</b> Serial ports are supported by these configurable parameters: port tag, baud, stop bits, data bits, parity, status, mode, key-on delay, turn around delay, retry count, retry time.</p>	CUSTOM DISPLAYS	<p>Two user-created custom displays can be stored by the firmware. The displays can contain both static and dynamic information.</p>

### Ordering Information

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